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Radio Shack®

DICTIONARY

of

ELECTRONICS

Rudolf F. Graf

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Rudolf F. Graf has been in the electronics industry for more than 30 years, in capacities ranging from instructor, sales engineer, and magazine editor to director of engineering and consultant. He is a graduate in communications engineering from Polytechnic Institute of Brooklyn and received his M.B.A. at New York University. He is a senior member of the IEEE and holds a first-class radio-telephone operator's license. Mr. Graf has written numerous books and articles of interest to amateur radio engineers. He is the coauthor of *Automotive Electronics*, *Solid-State Ignition Systems*, *Electronics Quizbook*, *Build-It Book of Car Electronics*, *Build-It Book of Safety Electronics*, *Build-It Book of Home Electronics*, all published by Howard W. Sams & Co., Inc.



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Preface

In recent decades, technological advances that profoundly affect our daily lives have taken place at a feverish pace in electronics and closely related fields. Invariably, those who work in these fields find that they need new vocabulary terms to effectively communicate thoughts and ideas about their fields of specializations. The originators of these new words give them their initial meaning, but *exact* definitions change with technological advances and through actual use by others. The content of a dictionary is thus an analysis of words and their meanings as determined by common usage.

Therefore, it should come as no surprise that this fifth edition of the *Modern Dictionary of Electronics*—probably the most up-to-date electronics dictionary in the world—contains definitions of approximately 20,000 terms unique to electronics and closely related fields. This includes 3000 more entries than were found in the fourth edition published in 1972, and nearly twice as many terms as were explained in the first edition of this Dictionary published 15 years ago! All earlier definitions were reviewed and modified or expanded, where necessary, to further enhance the intelligibility of each entry and to ensure meaningful, concise definitions requiring no further interpretation. The illustrations have been updated and modified as needed to help give greater clarity to the definitions.

While this volume is as up-to-date as possible at the time of writing, the field of electronics is expanding so rapidly that new terms are constantly being developed and old terms are taking on broader or more specialized meanings. It is the intention of the publishers to periodically issue revised editions of this dictionary; thus, suggestions for new terms and definitions will always be welcomed.

Acknowledgement and thanks are due several technical and engineering societies—notably the IEEE and ASA—who generously aided in defining many terms during the initial preparation of this work. In particular I want to express my appreciation to my good friend George J. Whalen for his invaluable comments and constructive suggestions.

RUDOLF F. CRAFT

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phase difference between two input signals. When used as an fm demodulator, the input is a set of push-pull signals and a reference voltage 90° displaced from each of them. These are taken across tuned circuits in such a way that the phase difference between the push-pull signals and the reference is very nearly proportional to the difference between the input frequency and the resonant frequency of the tuned circuits.

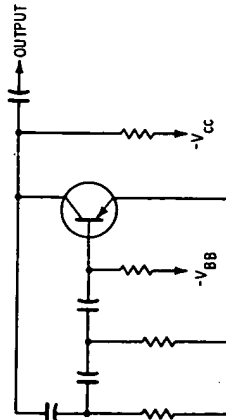
phase shifter—A device in which the output voltage (or current) may be adjusted to have some desired phase relationship with the input voltage (or current).

phase-shifting transformer—Also called a phasing transformer. A transformer connected across the phases of a polyphase circuit to provide voltages of the proper phase for energizing varmeters, var-hour meters, or other instruments. (See also Rotatable Phase-Adjusting Transformer.)

phase-shift keying—A form of phase modulation in which the modulating function shifts the instantaneous phase of the modulated wave between predetermined discrete values.

phase-shift microphone—A microphone the directional properties of which are provided by phase-shift networks.

phase-shift oscillator—An oscillator in which a network having a phase shift of an odd multiple of 180° (per stage) at the oscillation frequency is connected between the output and input of an amplifier. When the phase shift is obtained by resistance-capacitance elements, the circuit is called an RC phase-shift oscillator.



Phase-shift oscillator.

phase simulator—A precision test instrument which generates reference and data signals on the same frequency but precisely separated in phase. It is normally used to check out precision phase meters.

phase splitter—1. A device which produces, from a single input wave, two or more output waves that differ in phase from one another. 2. In color television, the stage which takes I and Q signals from demodulators, produces four signals, positive and negative I and Q, and feeds them to the matrix. 3. A circuit which

generates out of an ac input signal two equal-amplitude outputs, one of which is 180° out of phase with the other, i.e., one is the other inverted. The dc levels may not be identical.

phase-tuned tube (tr tubes)—A fixed tuned broad-band tr tube in which the phase angle through it and the reflection it introduces are kept within limits.

phase undervoltage relay—A relay which is tripped by the reduction of one phase voltage in a polyphase circuit.

phase velocity—1. The velocity at which a point of constant phase is propagated in a progressive sinusoidal wave. 2. The velocity with which a point where there exists an electromagnetic wave of a certain fixed phase, moves through of space in the direction of propagation of the wave. 3. phase-velocity—frequency response characteristic—A graph or other tabulation of the phase shift occurring, in an electrical transducer, at several frequencies within a band.

phasing—1. Causing two systems or circuits to operate in phase or at some desired difference from the in-phase condition. 2. Adjusting a facsimile-picture position along the scanning line. 3. In stereo application, the establishment of the correct relative polarity in the connection between amplifier output and speakers so that one speaker tends to reinforce rather than cancel the output of the other (particularly evident at low frequencies).

phasing capacitor—A capacitor used in a crystal-filter circuit for neutralizing the capacitance of the crystal holder.

phasing line—In facsimile, the portion of the scanning line set aside for the phasing signal.

phasing pulse—A short pulse or signal employed for phasing the recorder with the transmitter in a television or facsimile system.

phasing signal—In facsimile, a signal used for adjusting the position of the picture along the scanning line.

phasing transformer—See Phase-Shifting Transformer.

phasitron—A tube designed to produce a frequency-modulated audio signal, which is induced by a varying field from a magnet placed around the glass envelope of the tube.

phasor—An entity which includes the concepts of magnitude and direction in a reference plane.

pH electrode—Transducer sensitive to hydrogen ion concentration. The sensor comprises a thin-walled glass membrane (glass electrode) or spongy platinum exposed to gaseous hydrogen (hydrogen electrode) or platinum exposed to quinhydrone (quinhydrone electrode), all of

which develop an electric force proportional to the hydrogen-ion concentration of a solution when immersed in the solution.

phenolic material—Any one of several thermosetting plastic materials available which may be compounded with fillers and reinforcing agents to provide a broad range of physical, electrical, chemical, and molding properties.

Phillips gate—A vacuum gage in which gas pressure is determined by measuring the current in a glow discharge.

Phillips screw—A screw with an indented cross in its head, instead of the conventional slot. It must be removed or inserted with a special screwdriver, also called a Phillips.

phi polarization—In an electromagnetic wave, the state in which the E vector of the wave is tangential to the lines of latitude of some given spherical frame of reference.

pH meter—An instrument used with a probe to determine the alkalinity or acidity of a solution.

phon—The unit for measuring the apparent loudness level of a sound. Numerically equal to the sound-pressure level, in decibels relative to 0.0002 microbar, of a 1000-hertz tone that is considered by listeners to be equivalent in loudness to the sound under consideration.

phone—See Headphone.

phone jack—1. Also called a telephone jack. A jack designed for use with phone plugs. 2. Receptacle having two or more through circuits. May also have shunt circuits and/or isolated switching circuits. Used for extending circuits through mating plugs. Phone jacks are short or long types, depending upon physical dimensions.



Phone jack.

phonemes—The minimal set of shortest segments of speech which, if substituted one for another, convert one word to another. **phone plug**—Also called telephone plug. A plug used with headphones, microphones, and other audio equipment. It is a male connecting device (almost always connected to a cable) which connects with



Phone plug.

a phone jack. Consists usually of terminals and handle which comprise the circuit, terminals, insulators and handle. A cable clamp may or may not be of a phone plug design.

phonetic alphabet—A list of standard words, one for each letter in the alphabet. It is used for distinguishing the letters of a spoken radio or telephone message. list reads:

ALFA	NOVEMBER
BRAVO	OSCAR
CHARLIE	PAPA
DELTA	QUEBEC
ECHO	ROMEO
FOXTROT	SIERRA
GOLF	TANGO
HOTEL	UNIFORM
INDIA	VICTOR
JULIET	WHISKEY
KILO	X-RAY
LIMA	YANKEE
MIKE	ZULU

phonocardiogram—A graphic recording of the sounds produced by the heart and associated parts (e.g., its mitral or aortic valves).

phonocardiograph—An instrument for recording sounds of the heart on a chart.

phonocardiography—The recording and interpretation of the sounds of the heart. A typical instrument for this purpose consists of a microphone, an amplifier, cathode-ray tube or strip-chart recorder and sometimes a loudspeaker or hearing aid. **phono cartridge**—The means by which stylus movements are converted into electrical signal. Various versions of magnetic (moving iron, magnet, or ceramic-crystal, capacitive (electret), strain-gauge devices are in use.

phonocatheter—A catheter-microphone combination that is inserted through the artery into the heart. It picks up in cardiac sounds.

phonoelectrocardiograph—A dual-beam oscilloscope which develops both electrical and heart-sound signals.

phonograph—An instrument for reproducing sound. It consists of a turntable which the grooved medium containing impressed sound is placed, a needle rides in the groove, and an electrical (formerly mechanical) amplifying system for taking the minute vibrations of needle and converting them into electrical (formerly mechanical) impulses to drive a speaker.

phonograph oscillator—An rf oscillator circuit, the output of which is modulated by a phonograph pickup and sent through space to a receiver. Thus, no wires to receiver are needed.

phonograph pickup—Also called mechanical pickup.